BANGALORE ELECTRICITY SUPPLY COMPANY LIMITED

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Section – 6(E)

Preventive Maintenance and Break down Maintenance for RMUs, SPBs and LRC & LBS

"Expansion of Distribution Automation System to Peri-Urban areas of Bangalore city, District Headquarters & Industrial areas across BESCOM Jurisdiction".

Issued By

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1. Introduction:

This document contains the procedure for Preventive maintenance and break down maintenance for all RMUs, SPBs, LRCs & LBSs installed under the "Expansion of Distribution Automation System to Peri-Urban areas of Bangalore city, District Headquarters & Industrial areas across BESCOM Jurisdiction for a period of two years (4 cycles) including replacement of faulty spares.

2. Description of the work:

All the RMUs, SPBs, LRCs & LBSs installed under the "Expansion of Distribution Automation System to Peri-Urban areas of Bangalore city, District Headquarters & Industrial areas across BESCOM Jurisdiction are important and essential equipments of the Distribution Network. Faults and failure of the RMU, SPB, LRC & LBS will cause undesirable interruptions to significant and large number of consumers connected through the network. The key objective of Preventive maintenance is to avoid the failure of the above said equipments with routine schedule maintenance works and in case of breakdown of RMU, SPB, LRC & LBS, the problems are rectified immediately, thereby reducing down time.

3. Scope of Work :

The Scope of the work includes preventive and breakdown maintenance of All the RMUs, SPBs, LRCs & LBSs installed under the "Expansion of Distribution Automation System to Peri-Urban areas of Bangalore city, District Headquarters & Industrial areas across BESCOM Jurisdiction for a period of two years which includes spares required for preventive and breakdown maintenance for destination to Site basis, Transportation, Insurance, Storage, Handling and moving into the final position, Erection/fixing of spares, Testing at Site including any other related works.

The salient features of the scope include, but not limited to the following:

- The agency shall engage sufficient number of teams for RMUs, SPBs, LRCs & LBSs Preventive maintenance and Breakdown maintenance headed by a qualified Engineer having experience in erection & commissioning / repair /rectification of faults in RMUs, SPBs, LRCs & LBSs and each of these teams shall be assistedby the sufficient number of mechanics / skilled labourers having experience in erection & commissioning / repair / rectification of faults in RMUs.
- The agency shall make necessary arrangements for vehicles required for commutation and transportation of men and materials. No separate charges will be paid for this.
- The agency shall ensure to complete the preventive maintenance as per schedule and also ensure to attend RMUs, SPBs, LRCs & LBSs breakdown, so that RMUs, SPBs, LRCs & LBSs shall be kept healthy at all the times.
- The agency shall ensure a minimum gap of 6 months between 2 cycles of preventive maintenance so as to cover all the RMUs, SPBs, LRCs & LBSs existing in the field.
- The agency shall ensure availability of sufficient spare parts of all makes of RMUs, SPBs, LRCs & LBSs at all the times.
- In the event of any interruption of supply, consequent to the trouble in the RMUs, SPBs, LRCs & LBSs, the agency shall take necessary measures to repair the RMUs, SPBs, LRCs & LBSs immediately, to restore the power supply as per SOP from the time of issuance of Line Clearance by field staff for minor/major breakdowns.
- The agency shall establish a site store at his own cost where the RMUs, SPBs, LRCs & LBSs spare parts are stored, which are

readily available for the repair / rectification of faults in the RMU, SPB, LRC & LBS.

- RMUs, SPBs, LRCs & LBSs shall be taken up for annual preventive maintenance as defined below:
  - All the RMUs, SPBs, LRCs & LBSs existing in the field shall be cleaned and kept neat ensuring that it is vermin proof.
  - Checking for mechanical and electrical operation of opening and closing of Circuit Breaker and repair if needed.
  - Mechanical Critical setting and adjustment shall be done.
  - Lubrication of mechanical critical part of circuit breaker.
  - Lubrication of spring charging mechanism.
  - Alignment of doors.
  - Checking of operation and Physical healthiness of switches, Indication Lamps, auxiliary relays, meters etc.,
  - Inspection of closing & tripping coil condition and gap setting, to replace in case of fault.
  - Visual Inspection for wear & tear and rectify, if any.
  - Check to know whether there are any loose contacts leading to hot
    spots and rectify if any.
  - Test insulation resistance — using 5kV Insulation resistance tester.
  - Measurement of Earth resistance.
  - The insulators should be checked with relevant instrument.
  - Sensitivity of relays to be ensured duly taking inputs from field staff as required and measurement of operating time.
  - Routine Tests :
    i) Testing of Protective Relays.
    ii) CB Contact resistance.
  - Any defects identified during inspection or any other maintenance works as suggested by the Engineer in charge shall be taken up on priority.

- The Project Manager of the agency is the single point of contact between agency and BESCOM, who has to arrange the teams for preventive maintenance and break down maintenance in coordination with BESCOM officials.
- The line clears required for carrying out the preventive maintenance are to be planned, well in advance under the concerned BESCOM officials in consultation with the Project Manager. The field officers should ensure to complete annual maintenance of all the equipments existing in field by arranging the

required Line Clear. The Agency shall not be made responsible for non-issuance of line clears on time.

- The Agency shall ensure proper earthing of RMU, SPB, LRC & LBS and proper earthing needs to be provided to the RMU, SPB, LRC & LBS, wherever required.
- The Agency shall detect the leakage of SF6 gas with their own equipments, the SF6 gas levels should be checked if the gas pressure is within the permissible limits. If required, topping up of SF 6 GAS should be done up to the required level. If pressure of SF6 gas is not maintained even after topping up, then problem might be due to faulty manometer or due to cracks in the SF6 gas tank. Then such cases are to be considered under breakdown maintenance and fault is to be rectified using required spares.
- Consumables includes Connecting wires, Washers, bushing studs, Bolts & Nuts, Grease, terminal Block, lugs, ferrules, cable glands and minor spares includes Tripping coils, closing coils, terminal coils, switches, indicating lamps/switches, push buttons, operating handles/spring charging handle, shafts, Operating counter, MCBs, Fuses, Panel Lamps, metering CT brackets, Door limit switch/limit switch, power sockets, over current coils, indication plate, spring charge/ mechanical indicator, ON/OFF indicators, Door shock absorbers, coil mounting plates, surge arrestor, pressure switch, panel lock etc., The agency should claim once annually whenever the preventive maintenance is carried out on the RMU, SPB, LRC & LBS and the agency has to provide these consumables / minor spare parts without any extra cost irrespective of number of replacements annually, even if provided during breakdown maintenance.
- The Agency shall procure and supply all the spares and proprietary spares from the BESCOM approved vendors / OEM or vendors of OEM or equivalent as per IS/IEC/BESCOM approved specifications.

- The Contractor should affix the JOB card to each of the RMU, SPB, LRC & LBS The details of preventive / breakdown maintenance carried out on the equipment are to be updated in the JOB card along with indicating the next due date of preventive maintenance. The job card is to be signed by both the BESCOM Engineer and the Contractor. The Contractor should maintain the database / history of each equipment and submit the same to BESCOM for review / analysis. The Project Manager should submit the progress of equipment maintenance to BESCOM on regular basis and attend the meetings with BESCOM.
- Any injury or loss to the life of human being/animals or damages to any Government/ private property during the execution of work shall be on the account of Agency and has to make good the damages, claims arising out of injury or loss to the life or damages shall have to be borne and settled by the Agency.
- It is the responsibility of the Agency to carry out work in safe manner and at most utilization of safety equipment's.
- The Agency has to abide by the prevailing standard safety policy.
- The Working area shall be barricaded properly with MS barricading sheets. This is required for the safety of the traffic and the pedestrians. The Agency shall be the responsible for any mishap which may occur on account of its not taking necessary precautionary measures. The barricades shall be fixed at work place before execution of the work. Required information regarding the work as specified shall be written on these barricading sheets.
- All the necessary equipments/materials shall be supplied by the awarded agency in accordance to the requirement of the work from time to time.
- The guarantee for the spares replaced shall be for a period of 24 months from the date of commissioning of the material.

- All the materials / spare parts required for replacement purpose **shall be sourced by the Agency himself.**
- The components/spare parts replaced shall be of same make and specification. If the components/spare parts are not available, then prior approval from BESCOM shall be obtained before replacing with equivalent specifications.
- The Schedule of materials furnished in the spare list are indicative in nature for preventive / breakdown maintenance works, it shall not be presumed that only these indicative materials are only to be supplied and utilized for the maintenance of RMUs, SPBs, LRCs & LBSs.
- Physical Inspection call letter for the materials sourced from the manufacturers/BESCOM approved vendors shall be given to The General Manager (Ele.,), DAS, SG & TIC, BESCOM, who in turn shall arrange to get the materials inspected at the site stores and on acceptance of the materials, dispatch instructions will be issued so that materials/ spare parts shall be utilized at the required site.
- After inspecting the failed RMUs, SPBs, LRCs & LBSs, the Engineer in charge in coordination with team head has to decide if the breakdown is major or minor and the breakdown maintenance team shall immediately rectify fault.
- The contractor shall keep standby (Spare) during AMC period (each one number) 3way RMU, 4way RMU, 5way RMU, LRC & LBS . In the event of complete flashover / unable to repair immediately / major breakdown, the immediate power supply is to be restored by utilizing the standby (Spare) 3way RMU, 4way RMU, 5way RMU, LRC & LBS. The Contractor has to maintain the standby (Spare) 3way RMU, 4way RMU, 5way, SPB, LRC & LBS in stock procured for AMC purpose under this project. After successful completion of AMC period, these standby (Spare) 3way RMU, 4way RMU, 5way RMU, LRC & LBS shall to be returned to BESCOM in good condition.

- Any other items for works not specifically mentioned, but which are essentially required for satisfactory performance & completeness of the maintenance contract / works shall be deemed to be included in the scope of works and the same shall be executed/carried out by the Agency with extra cost as per BESCOM SR or Market price as mutually agreed and approved by General Manager (Elec), DAS, BESCOM.
- The Agency shall arrange for operational tools and tackles at his own cost.
- If any of the spare parts /components replaced during the Preventive/ Breakdown maintenance of RMUs, SPBs, LRCs & LBSs, fails within the guarantee period then those shall be replaced at free of cost by the agency and if the RMUs, SPBs, LRCs & LBSs breakdowns due to the failure of component/ spare parts replaced during the Preventive/ Breakdown maintenance of RMUs, then in that case Breakdown maintenance charges shall not be claimed by the agency.
- The contractor shall be responsible for the buyback of released/defective spares under buyback scheme and released/defective spares shall be disposed as per prevailing norms.

4. TIME – THE ESSENCE

The timelines for carrying out regular preventive maintenance and break down maintenance activities including Bi-annual maintenance as detailed in the scope of the works and so incorporated shall be deemed to be the essence of the Contract. The key objective for engaging is to avoid failure of RMUs, SPBs, LRCs & LBSs with routine scheduled maintenance works and in case of breakdown of RMUs, SPBs, LRCs & LBSs, the problems are rectified immediately reducing the down time and to maintain these remote devices communicable with DAS control room. The firm shall so organize his resources and

perform his work as to complete the work in stipulated timelines deputing sufficient batches.

5. GUARANTEE :

The Contractor shall guarantee that all Equipment spares supplied by him will be new, unused and in accordance with the Contract Documents and free from defects in Material and Workmanship for a period of 24 Months from the date of replacement. No repairs or replacement shall normally be carried out by BESCOM, when the Equipment is under the supervision of the Contractor's Supervisory Engineer.

Any defects noticed and/or failures/breakdown occurred during this period shall be rectified at free of cost to BESCOM. If they are not rectified or replaced within this period, the contractor shall pay Liquidated Damages (prorate basis) as per Liquidated Damages clause in the contract for the delay from the date of receipt of intimation for the defects or failures.

The incidental expenses, transport and freight charges for the replacement of defective materials within the contract period may also be borne by the contractor till such time it serves its stipulated contract period.

The acceptance of the works by BESCOM shall in no way relieve the contractor of his obligations under guarantee clause.

6. DELAYS IN THE CONTRACTOR'S PERFORMANCE:

Delay by the Contractor in the Performance of his obligations under the Contract shall render the Contractor liable for any, or all of the following sanctions:

- Forfeiture of his Performance Guarantee.
- Imposition of Penalty and/or
- Termination of Contract for default as detailed herein.

If, at any time during Performance of the Contract, the Contractor should encounter conditions impending timely delivery of the Goods

and for Performance of Services, the Contractor shall promptly notify the BESCOM, in writing, of the fact of the delay, its likely duration and its cause(s). Upon receipt of the Contractor's request, the BESCOM shall evaluate the situation and may, at his discretion, extend the time for Performance, in which case the extension shall be ratified by an amendment to Notification of Order /Contract Agreement.

7. RECOMMENDED SAPARES:

The minimum recommended spares that have to be kept for regular Preventive and Breakdown Maintenance are listed below:

Sl. No.	Description
1	OD Operating Mechanism
2	VL Operating Mechanism
3	Control Card
4	Relay
5	12V SMPS
6	24V SMPS
7	Batteries Lithium Iron Phosphate (LiFePO4) (LFP) 12 VDC, 42Ah
8	2 Pole MCB
9	Single Pole MCB
10	Auxiliary Switch VL
11	Auxiliary Switch OD
12	Terminal Blocks
13	FPI Full Kit
14	Multi Function Meter
15	Battery Charger 24V 10A
16	Local Remote Switch
17	Mono Meter
18	Mono Meter NRV
19	SF6 Gas
20	VPI Indicator Sets
21	Surge Arrestors
22	Auxiliary Transformer (AT)
23	Potential Transformer (PT)
24	Current Transformers
25	HRC Fuse
26	Door Hinges
27	Surface Heaters

28	Cable Box Interlock
29	Shunt Trip Coils
30	Manual Operating Handle
31	Cable Boots
32	Cable Clamps
33	Door dampers or Hydraulic Rods
34	Two Position Selector Actuator
35	Isolator Mechanism
36	VCB Mechanism
37	24V DC Spring Charge Motor
38	Inter Lock Card
39	Relay Card
40	RMU Partial Control Wiring
41	RMU Major Control Wiring
42	Copper Bus Bar
43	Bush Connecting Aluminium Shaft
44	Bush Safety Rubber
45	Microswitch
46	Main Bushing Assemble & its accessories
47	RS485 Communication two core cable with Earth Sleeve
48	Door or Metal Sheets
49	Gland Plates with cable clamp
50	Spring Charging Handle Assembly
51	Earth switch Assembly
52	Bushing for Bus Bar Cable Box
53	Bus bar Support Insulator
54	FRTU Module-LRC
55	Main Board-LRC
56	Analogue Board-LRC
57	Communication Board-LRC
58	Display Board-LRC
59	UPS Module-LRC
60	Magnetic Contactor (Open/Close)-LRC
61	Power Cable (common for both LRC & LBS)
62	Terminal Lugs-(common for both LRC & LBS)
63	SPD -Surge Protection Device
64	Lightning Arrestor (common for both LRC & LBS)
65	Auxiliary Transformer (common for both LRC & LBS)
66	FRTU Module-LBS
67	Main Board-LBS
68	Analogue Board-LBS
69	Power Board-LBS

70	Communication Board-LBS
71	Display Board LBS
72	Auxiliary Transformer in control Box LRC/LBS
73	Control Cable (common for both LRC & LBS)
74	Wiring set of control cabinet for LRC
75	Wiring set of LRC inside Tank
76	Driver Card for LRC
77	Driver box Assembly for LRC
78	Voltage/Current PCB Assembly for LRC
79	Controller Board FTU-LBS
80	CTPT board for FTU-LBS
81	Wiring set of control cabinet for LBS
82	Wiring set of LBS inside Tank
83	DC Motor mechanism Assembly for LBS
84	Voltage/Current PCB Assembly for LBS
85	Polymer bushing (common for both LRC & LBS)
86	Limit Switch (common for both LRC & LBS)
87	Civil work including renovation of RMUs, SPBs, LRC & LBS foundation by providing basic concrete work, plastering etc.
88	Providing Rod Type Earthing
89	GI strip

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